

REMARKS

35 USC 112, first paragraph

Claims 1-13, 28, 29, 31-44 and 47 have been rejected under 35 USC 112, first paragraph as failing to comply with the written description requirement.

Particularly, the Examiner asserts that the limitation “between the electrodes” in claim 1 is not supported by the disclosure as originally filed.

However, as clearly shown in FIG. 3 of the application as originally filed, a heating element 50 is clearly positioned between electrodes 46 and 54.

Note also paragraph 0018: “While not shown the fuel cell stack 65 would include a resistive heater as in Figure 3 integrated within the porous thick film 64 or fuel cell stack 65.”

Note also paragraph 0021 as originally filed: “The fuel cell stack 85 includes an electrode 86, an electrolyte 87, an electrode 88, and a heater element, not shown, but which may be constructed as in the Figure 3 embodiment.”

These sections as originally filed in combination with FIG. 3 clearly support the claimed “between the electrodes” in the limitation “an electric heater positioned in at least one location selected from: between the electrodes, and along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack.”

While the foregoing is deemed sufficient to overcome the rejection, paragraph [0021] has been amended to provide additional textual support for the claim limitation. While the added description is inherent from FIG. 3, the Examiner is also invited to see the description of FIG. 3 in US Patent Application Serial number 09/241,159, filed February 4, 1999, assigned to the same assignees and which was incorporated by reference in the present application in paragraph [0003]. See MPEP 608.01(p).

No new matter has been added.

Accordingly, withdrawal of the rejection is respectfully requested.

Claims 1-7, 9, 10, 12, 13, 28, 29, 31, 32, 34-41

Claims 1-7, 9, 10, 12, 13, 28, 29, 31, 32, 34, 37, 39-41 have been rejected under 35

USC 103(a) as being unpatentable over Maru (US4365007) in view of Ito (US5227258) and in yet further view of Keskula (US2004/0151955).

The analysis of obviousness was set forth in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966). In order to establish a *prima facie* case of obviousness, three basic criteria must be met:

First, there must be some *suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of the references. Second, there must be a *reasonable expectation of success*. Finally, the prior art reference or combined references must teach or suggest *all the claim limitations*. *The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure (In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); (emphasis added).*

Applicants respectfully traverse the rejection as failing the *Graham* test. Specifically, the combination proposed in the rejection fails at least the first and third elements of the *Graham* test.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

In the rejection, the Examiner relies on newly cited Keskula (US2004/0151955) to show the claimed "an electric heater positioned in at least one location selected from: between the electrodes, and along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack".

However, as clearly shown in Keskula Fig. 1 and paragraphs 0035-0037, the heating element 52 is in the combustor 34. Effluent from the combustor is used to heat the heat exchanger 14, and then is dumped to the atmosphere. The heat exchanger in turn heats the catalyst of the fuel processor for enhancing the formation of hydrogen gas from feed materials 6 and 8, which is in turn sent to the fuel cell 22 via line 20.

Accordingly, Kukula's heater is not positioned along a fuel path at a point upstream from the fuel cell stack, as claimed. Rather, Kukula's heater is in a combustor out of the fuel path, the effluent of which is used to heat a *heat exchanger* along the fuel path. Thus, not all elements are taught or suggested in the prior art, and the rejection fails the third prong of the *Graham* test.

Applicants also respectfully traverse the rejection of claim 1 as being improper, as it would render Maru's invention unsatisfactory for its intended purpose. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

In the rejection, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an electric heater and combustor along the fuel passage of Maru modified by Ito for the benefit of vaporizing the fuel prior to entering the reformer. However, as is clear from Keskula, the purpose of the combustor is to burn fuel. Note Keskula burns MeOH in the combustor, as well as uses MeOH to generate the fuel by catalytic reaction. If Maru's fuel were drawn through Keskula's combustor, the fuel would burn up into combustion byproducts that Maru's reforming catalyst 8 would probably not be able to convert (or "reform") into sufficient quantities of hydrogen.

Accordingly, the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, and there is no suggestion or motivation to make the proposed modification. *In re Gordon, supra*.

Claims 2-7, 9, 10, 12, 13, 28, 29, 31, 32, 34, 37, 39-41 depend from claim 1, and therefore incorporate the limitations of claim 1. By virtue of their dependence, claims 2-7, 9, 10, 12, 13, 28, 29, 31, 32, 34, 37, 39-41 are also believed to be allowable. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Reconsideration and allowance of claims 2-7, 9, 10, 12, 13, 28, 29, 31, 32, 34, 37, 39-41 is respectfully requested.

Additionally, regarding the rejection of claims 2, 3 and 7, Applicants note that the rejection fails to consider the dimensional limitations. Accordingly, it is believed that the limitations are novel. Reconsideration and allowance of claims 2, 3, and 7 is respectfully requested.

Regarding the rejection of claim 12, the Examiner indicates that the claimed dimension is a result effective variable. The courts have held that a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). In the instant case, the Examiner indicates that the size of the flow passage is a result effective variable because the size of the flow passage controls the amount of gas being reformed and the amount of energy generated by the fuel cell. Applicants respectfully challenge such an assertion, and rather assert that the Examiner's assertion is erroneous on several grounds. First, the amount of gas being reformed and energy generated by the fuel cell is a function of pressure and feed rate rather than of the flow passage size. See, e.g., paragraph [00011] of the present application, which states in pertinent part: "[t]he MEMS processes allow individual control of gas flow to each cell through use of microvalves as well as the ability to control and regulate gas pressure or fuel flow throughout the device."

Second, and perhaps more compelling, is that the Examiner's assertion finds no support in the art of record. Because this feature is not found in the prior art, the rejection of claim 12 relies on official notice. Official notice unsupported by documentary evidence should only be taken by the examiner where the facts asserted to be well-known, or to be common knowledge in the art are capable of instant and unquestionable demonstration as being well-known. As noted by the court in *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970), the notice of facts beyond the record which may be taken by the examiner must be "capable of such instant and unquestionable demonstration as to defy dispute" (citing *In re Knapp Monarch Co.*, 296 F.2d 230, 132 USPQ 6 (CCPA 1961)). It is never appropriate to rely solely on "common knowledge" in the art without evidentiary

support in the record, as the principal evidence upon which a rejection was based. *Zurko*, 258 F.3d at 1385, 59 USPQ2d at 1697.

Applicant respectfully challenges the taking of official notice, and respectfully asserts that it was not notorious and well known in the art of fuel cells at the time of invention to have flow passages within the claimed dimensions as suggested by the Examiner. As evidence of the erroneous taking of official notice, Applicants points to the absence of any mention that the prior art teaches or suggest the claimed dimensions or of controlling a fuel flow rate by passage thickness. To assert that it would have been obvious to construct a flow passage within the claimed range is simply too tenuous an assertion. Accordingly, claim 12 is believed to be distinguishable from the art of record in nay combination.

If a future rejection of claim 12 relies on Official Notice, Applicants request a specific showing in the art of fuel cells of flow control using dimensions of a flow passage, and that meets all of the *Graham* criteria, and further that predates Applicants' date of invention.

Claims 8, 47

Claims 8 and 47 have been rejected under 35 USC 103(a) as being unpatentable over Maru (US4365007) in view of Ito (US5227258) and in yet further view of Keskula (US2004/0151955) and in still yet further view of Carter (US2003/0232230).

Claims 8 and 47 depend from claim 1, and therefore incorporate the limitations of claim 1. Claim 1 is believed to be allowable over Maru, Ito and Keskula, as discussed in detail above. Claim 1 is also believed to be allowable over the combination of Maru, Ito, Keskula and Carter, as the combination of art fails to teach or suggest all limitations of claim 1. Accordingly, claims 8 and 47 are believed to be allowable over the combination of art proposed in the rejection.

Claims 11, 39, 40

Claims 11, 39 and 40 have been rejected under 35 USC 103(a) as being unpatentable over Maru (US4365007) in view of Ito (US5227258) and in yet further view of Keskula (US2004/0151955) and in still yet further view of Mallari (US2003/0044674).

Claims 11, 39 and 40 depend from claim 1, and therefore incorporate the limitations

of claim 1. Claim 1 is believed to be allowable over Maru, Ito, and Keskula, as discussed in detail above. Claim 1 is also believed to be allowable over the combination of Maru, Ito, Keskula and Mallari, as the combination of art fails to teach or suggest all limitations of claim 1. Accordingly, claims 11, 39 and 40 are believed to be allowable over the combination of art proposed in the rejection.

Claim 42

Claim 42 has been rejected under 35 USC 103(a) as being unpatentable over Maru (US4365007) in view of Ito (US5227258) and in yet further view of Keskula (US2004/0151955) and in still yet further view of Sederquist (US2003/0003332).

Claim 42 depends from claim 1, and therefore incorporates the limitations of claim 1. Claim 1 is believed to be allowable over Maru, Ito and Keskula, as discussed in detail above. Claim 1 is also believed to be allowable over the combination of Maru, Ito, Keskula and Sederquist, as the combination of art fails to teach or suggest all limitations of claim 1. Accordingly, claim 42 is believed to be allowable over the combination of art proposed in the rejection.

Claims 1 and 33

Claims 1 and 33 have been rejected under 35 USC 103(a) as being unpatentable over Holladay (US7077643) in view of Ito (US5227258) and in yet further view of Keskula (US2004/0151955).

In the rejection, the Examiner relies on newly cited Keskula (US2004/0151955) to show the claimed “an electric heater positioned in at least one location selected from: between the electrodes, and along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack”.

However, as clearly shown in Keskula Fig. 1 and paragraphs 0035-0037, the heating element 52 is in the combustor 34. Effluent from the combustor is used to heat the heat exchanger 14, and then is dumped to the atmosphere. The heat exchanger in turn heats the catalyst of the fuel processor for enhancing the formation of hydrogen gas from feed materials 6 and 8, which is in turn sent to the fuel cell 22 via line 20.

Accordingly, Kukula's heater is not positioned along a fuel path at a point upstream from the fuel cell stack, as claimed. Rather, Kukula's heater is in a combustor out of the fuel path, the effluent of which is used to heat a *heat exchanger* along the fuel path. Thus, not all elements are taught or suggested in the prior art, and the rejection fails the third prong of the *Graham* test.

Applicants also respectfully traverse the rejection of claim 1 as being improper, as it would render Maru's invention unsatisfactory for its intended purpose. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

In the rejection, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an electric heater and combustor along the fuel passage of Maru modified by Ito for the benefit of vaporizing the fuel prior to entering the reformer. However, as is clear from Keskula, the purpose of the combustor is to burn fuel. Note Keskula burns MeOH in the combustor, as well as uses MeOH to generate the fuel by catalytic reaction. If Maru's fuel were drawn through Keskula's combustor, the fuel would burn up into combustion byproducts that Maru's reforming catalyst 8 would probably not be able to convert (or "reform") into sufficient quantities of hydrogen.

Accordingly, the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, and there is no suggestion or motivation to make the proposed modification. *In re Gordon, supra*.

Claim 33 depends from claim 1 and so is also believed to be allowable based on its dependence.

Claims 43 and 44

Claims 43 and 44 have been rejected under 35 USC 103(a) as being unpatentable over Maru (US4365007) in view of Ito (US5227258) and in yet further view of Keskula

(US2004/0151955) and in still yet further view of Shioya (US6777118).

Claims 43 and 44 depend from claim 1, and therefore incorporate the limitations of claim 1. Claim 1 is believed to be allowable over Maru, Ito, and Keskula, as discussed in detail above. Claim 1 is also believed to be allowable over the combination of Maru, Ito, Keskula and Shioya, as the combination of art fails to teach or suggest all limitations of claim 1. Accordingly, claims 43 and 44 are believed to be allowable over the combination of art proposed in the rejection.

Rejoinder

Prior to issuance, Applicants respectfully request rejoinder of any withdrawn claims depending from an allowed claim.

Conclusion

In the event that the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, he or she is respectfully requested to initiate the same with the undersigned at (408) 971-2573.

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Respectfully submitted,

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